MERCURY MINES ALONG THE OAK GROVE FORK OF THE CLACKAMAS RIVER

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Introduction:

The Nisbet and Kiggins mines are located on the Mt. Hood National Forest, just over 30 miles upstream from the city of Estacada, among the headwaters of the Clackamas River in the Oregon cascades (see fig. 1) (USFS, *Kiggins and Nisbet* 1). The mines, within a mile of each other, are immediately adjacent to the Oak Grove Fork of the Clackamas River (Brooks 105). The watershed became host to these operations in the 1920s, and although they are now abandoned they continued to operate there for several decades (Brooks 107; USFS *Kiggins* 2; USFS *Nisbet* 3). The Clackamas is the sole source of drinking water for thousands of community residents, critical habitat for a number of threatened or endangered native species, as well as a thriving outdoor recreational area for fishing, camping and whitewater rafting (Clackamas River Basin). Unfortunately, recent scientific investigations suggest that toxics associated with the mines may put part of the watershed and some of its users at risk (USFS, *Kiggins* 3; USFS, *Nisbet* 3; ODEQ, *Kiggins* 15; ODEQ, *Nisbet* 15). Over the next few months regulating authorities are expected to determine the extent of the contamination and what, if any, remediation will be initiated at the mines (ODHS, *Arsenic* 4; ODHS; *Methylmercury* 1; DeRoo).

Fig. 1. Watershed of the Oak Grove Fork of the Clackamas.
Photo by author.*
*All photos by the author were taken on May 29th and 30th of 2004.

Background:

The interplay between the area's climate and its geology serves to promote the movement of water through the earth as well as the movement of earth through the water. The watershed of Oak Grove Fork of the Clackamas features permeable soils on steeply sloping hillsides fed by high levels of rainfall resulting in substantial erosion with additional shifts resulting from earth movements along faultlines (ODEQ, *Kiggins* 4-5;

ODEQ, *Nesbit* 4-5; USFS *Kiggins and Nisbet* 1-3). Set in motion together, the soils transport the water until the flows of water ultimately transport the soils, flowing into existing channels and creating new ones as well, sometimes working with unexpected force like a sudden landslide (see fig. 2) and at other times working more subtly like a river wearing down rock (USFS, *Kiggins and Nisbet* 3).

Figure 2. Effects of land movement on Forest Service Road #57.
Note: This is the second time in two years that this road, just uphill from the mines has been forced to close due to major landslides.
Photo by author.

Miners prospecting this area in search of a commodity they could sell for a profit found mercury, which has been prized for thousands of years, first for its decorative value and its medicinal properties, then as the new world was discovered mercury became known for its ability to form amalgams and recover even small traces of more precious metals like silver and gold, and while the development of cyanadization in 1890 meant the decline of the use of mercury for mining other metals, the age of world wars and industry brought new demands for mercury (Schuette 10; Brooks 4). By 1938 it was estimated that ¼ of domestic consumption of mercury was directly related to the production of munitions while nearly ¾ was being used across a variety of commercial applications including the manufacture of batteries, lamps and amalgams for dental fillings (Scheutte 71-75). Mercury was then the third most valuable mineral, behind only gold and silver (Schuette 13). The price paid for mercury was anything but stable, however, swinging from lows nearing $.65/pound in the mid 1930s to highs of nearly $2.50/pound less than 10 years later during World War II, only to have prices then collapse to record lows in the postwar years (Brooks 10-12).

Mercury most commonly occurs within cinnabar ore, a reddish crystal of mercuric sulfide (see figs. 3 and 4) (Brooks 19). The fundamental process for deriving the silver-colored elemental mercury from its ore generally relies upon some process of heating the ore in order to cook-out the mercury (see fig. 5) whereby at temperatures in excess of mercury's vaporization point of 300° C the sulfur dioxide cooks-off and produces a vapor of mercuric oxide that upon cooling then separates out to oxygen and elemental mercury, and when the ore is roasted at lower temperatures just beneath mercury's vaporization point, but where it is still highly mobile, metal mercury may also be simply collected in a pan after melting through or around the ore (Brooks 5-7). At the time of the operation of the Kiggins and Nisbet mines, these methods would have commonly been expected to recover at least 95% of the mercury from it ores (Schuette 27). The remainder, however, did not exactly just disappear, as historical accounts of another mercury mine in Oregon of the same era, the furnace at the Black Butte Mine above Cottage Grove produced so much lost mercury vapor that "…at times the miners could see the mercury clinging to the needles of the surrounding trees…" (Maben). Mercury left trapped among the ore after being roasted could simply be re-roasted in order to minimize that potential loss, otherwise it would be discarded among the waste-rock (Brooks 5-7).

Fig. 3. Calcite vein bearing cinnabar at the Nisbet mine. Note: The white calcite vien is approx. 4" in width, and is generally encased by narrow red veinlets of cinnabar. Photo by author.

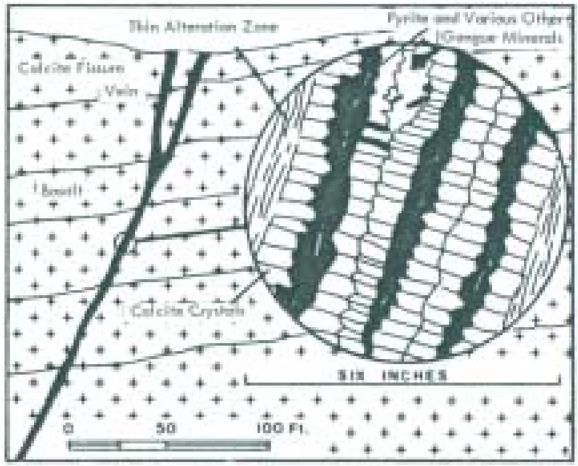

Fig. 4. Illustrated cross-section of mercury ore.
Note: This is typical of the geology found at the Kiggins and Nesbit mines.
Reprinted from Howard Brooks, Quicksilver in Oregon, Oregon Department of Geology and Mining Bulletin No. 55 (Portland, 1963), 25.

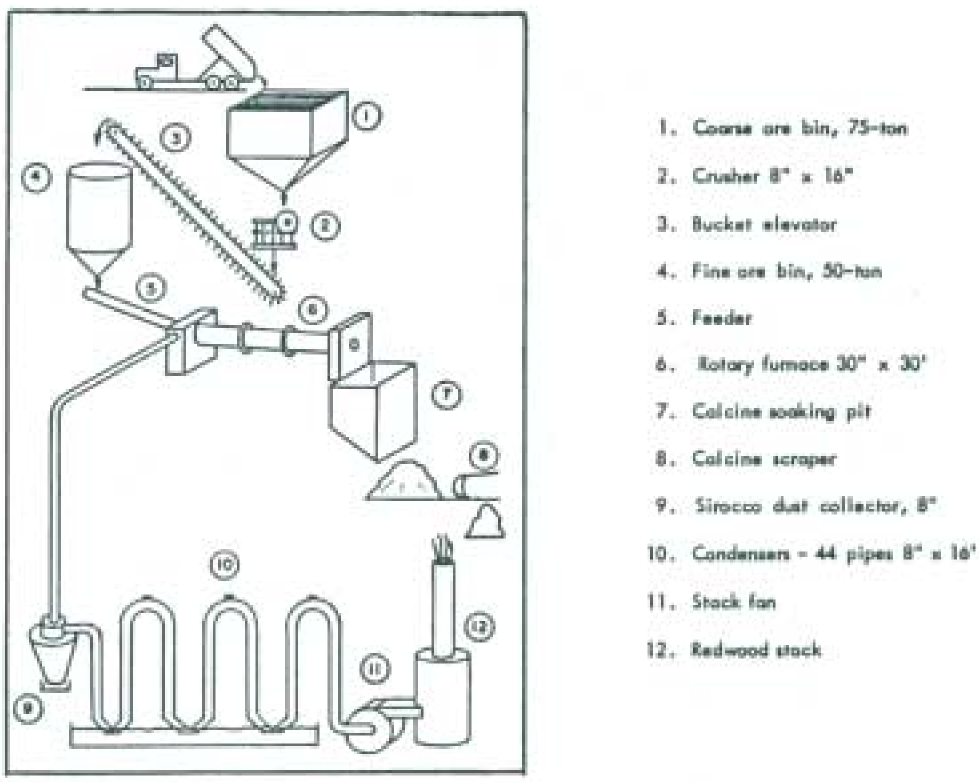

Fig. 5. Illustrated schematic of process for extracting mercury from ore.
Note: When mercury is roasted at a temperature in excess of its vaporization point, 300°C, it becomes released from its ore. The mercury is then collected either as a refined discharge from the waste-ore stream (steps 6-8) or after its vapor condenses though a cooling apparatus (steps 9-12.) Reprinted from Howard Brooks, Quicksilver in Oregon. Oregon Department of Geology and Mining Bulletin No. 55 (Portland, 1963), 6.

The first significant production of the mercury in Oregon is believed to have been underway by the 1880s (Brooks 15). Since then more than 300 occurrences of mercury have been identified throughout the state (Loy 88). The peak of Oregon’s production of mercury was from the period of 1927-1957, and while Oregon's production typically amounted to less than 10% of production nationwide, nevertheless during this period Oregon was ranked second, behind California, among all US states for mercury production, and later slipped to third behind Nevada (Brooks 15).

The Kiggins and Nisbet Mercury Mines:

George Nisbet filed the first claims to these mineral rights in 1923 and 1924 (Brooks 107). The years Nisbet made various arrangements with a number of other miners or mine owners, most notably including D.E. Kiggins, to work on, lease or even take ownership of his prospects and claims (Brooks 107). Two sites were developed. What is now known as the Kiggins Mine extended for 550 feet of workings through three tunnels (see figs. 6 and 7) and what is now known as the Nisbet Mine was developed through five tunnels and one shaft and extended through 500 feet of workings (see figs. 8 and 9) (Brooks, 108).

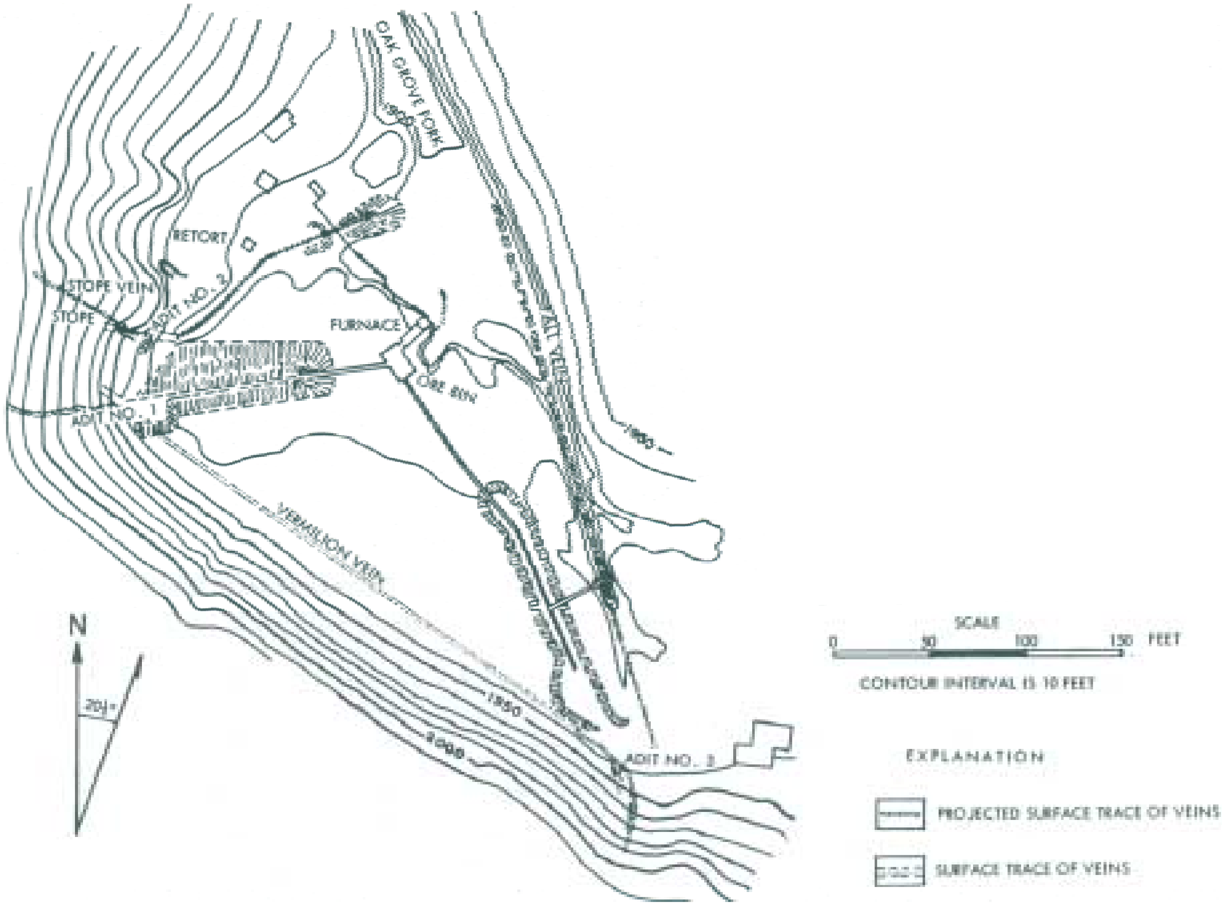

Fig. 6. Illustration of the Kiggins Mine workings circa 1943.
Note: Though not emphasized on this map, the Oak Grove Fork of the Clackamas River runs from the south-southeast to the north-northwest along the Fall Vein and passes immediately along the base of the furnace. Originally mapped by R.E. Brown and G.W. Walker and reprinted from Howard Brooks, <u>Quicksilver in Oregon</u>, Oregon Department of Geology and Mining Bulletin No. 55 (Portland, 1963), 109.

Fig. 7. Tunnel #3 at the Kiggins Mine.
Photo by author.

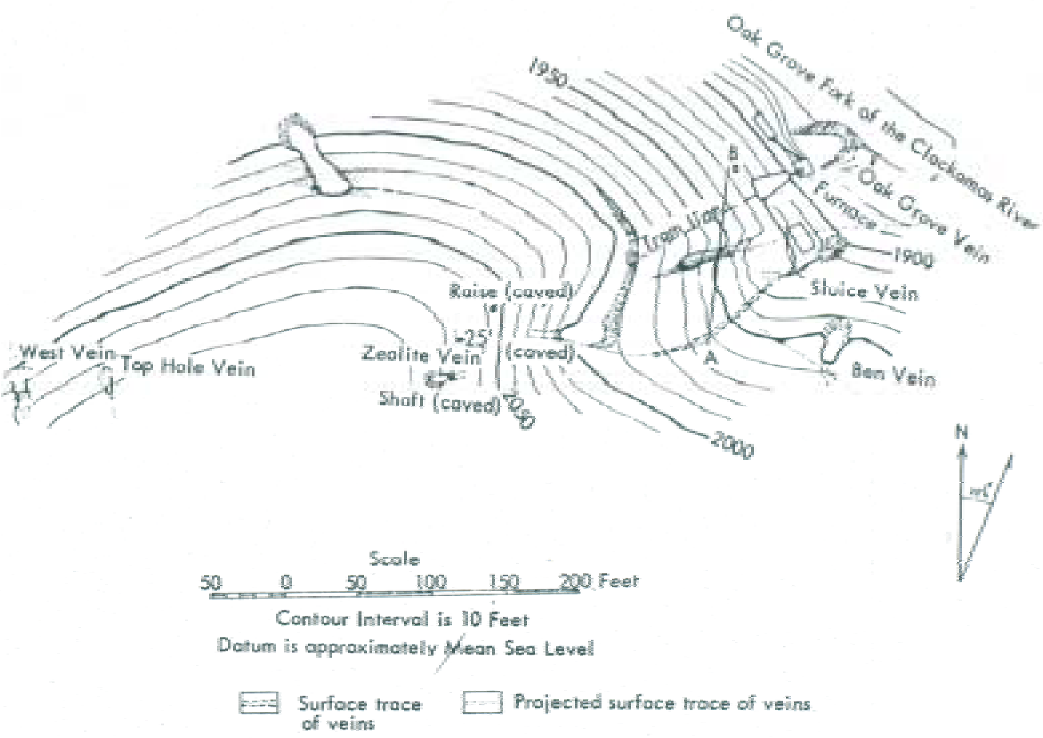

Fig. 8. Illustration of the Nisbet Mine workings circa 1943.
Originally mapped by R.E. Brown and G.W. Walker and reprinted from Howard Brooks, Quicksilver in Oregon, Oregon Department of Geology and Mining Bulletin No. 55 (Portland, 1963), 110.

Fig. 9. Tunnel on the Sluice Vein at the Nisbet Mine.
Photo by author.

The interplay among soil and water in the flow of the river has played an important part in the history of the mines. While the Oak Grove Fork of the Clackamas River generally enjoys similarities with other upland streams in western Oregon, being fed and cooled in the shade of a complex riparian zone, flowing over coarse substrate through a relatively steep grade down a fairly confined channel (see figs. 10 and 11), the river, however, has undergone significant changes from its natural state, due in part to the development of a series of hydroelectric projects along its entire length. In 1924 Portland General Electric installed a run-of-the-river-type dam no more than a mile upstream of the mines that diverts 300 CFM, almost the entire normal flow of the river, to the Oak Grove Hydroelectric Project, which produces a peak output of 49,000 kW, nearly seven miles to the northwest (see figs. 12 and 13) (USGS, *Water Quality* 11). As a result of the dramatic decrease in the river's natural flow, the exploration of ore-bearing veins in the riverbed, the development of tunnels and ore roasting operations near the river were all made more feasible and more generally protected from periodic flooding, greatly facilitating the operations of the Kiggins and Nisbet mines and in particular enabling their operations to be built so close alongside the river. By moderating the river's flow, the dam above the mines also has functioned to slow the natural pace of erosion that would have carried mine-wastes as well as any naturally occurring mercury downstream (Rapp 103). Downstream from the mines in 1911 Portland General Electric began generating power from the River Mill Dam, which is still in place along the Clackamas. Two other dams on the river were constructed in the 1950s and 1960s, respectively (Loy 100). As dams trap sediment and detritus, impeding it from flowing any further downstream, mine-wastes and naturally occurring mercury may be accumulated there. The slow flow, warmer temperatures and recreational uses of reservoirs combine to create habitat that tends to support algal growth, filter feeders, and predators not normally found on the river. As a result there's an increased risk of bioaccumulation of mercury as the river eutrophies and the trophic levels of the food web increase (Rapp, 102-3; USGS *Mercury Contamination* 3-7).

Figure 10. Downstream of the Kiggins Mine on the Oak Grove Fork of the Clackamas.
Photo by author.

Figure 11. Upstream of the Nisbet Mine on the Oak Grove Fork of the Clackamas.
Photo by author.

Figure 12. PGE's Oak Grove Hydroelectric Project
Note: Unauthorized access to the site is prohibited.
Photo by author.

Figure 13. Dam at Lake Harriet on the Oak Grove Fork of the Clackamas above the mines.
Photo by the author.

Accurate and complete production records for the Kiggins and Nisbet mines are themselves precious commodities, leaving researchers largely dependent on mining the writings of Brooks (1963) and Schuette (1938), who each compiled general information about mercury mining in Oregon over the time period in question, and a handful of pages altogether on the Kiggins and Nisbet Mines for the Oregon Department of Geology and Mining (USFS, *Kiggins and Nisbet* 3). Some of the discrete pieces of information they submit on the specific sites may be entirely accurate, and some inferences about the mines' history based upon their information may be reasonably sound, but their information appears to leave a great deal about the mines' history essentially unknown.

Brooks reprinted production records for both mines that were maintained by the U.S. Bureau of Mines for 1932-1943 although this information may not be complete (107). According to those records the total production from both sites adds up to 13,148 pounds of mercury (Brooks 107). This record does not include any production from the filing of the first claims in 1924 until the year 1934, despite the fact that Nesbit had actually gone so far as to build a shaft-furnace on the site in 1926 (see fig. 14) (Brooks 14, 107). Second, the production capacity of the mines far overmatched the record of production, especially with the addition of the second furnace built in 1939 at the Nisbet site (see fig. 15). That second furnace alone had the capacity to process all of the ore from both mines for even the most productive of year on record by operating at just 12% of its potential (Brooks 107). Even more astonishingly, the capacity of the second furnace was 91 times larger than the largest annual production of the mines up until the time it was built (Brooks 107). Additionally, the 1943 site diagrams of Brown and Walker indicate yet another ore roaster was then on site, this one being a retort that used an indirect heat source (Brooks 109-110). Third, though no production after 1943 is recorded, USGS records and Brooks' writings suggest that from 1960 until at least 1963 A.O. Bartell received a federally subsidized loan for mercury "exploration" on the Nisbet mine from the U.S. Department of the Interior's Office of Mineral Exploration program, yet the existence of any production during this period remains denied, perhaps relating to the fact that the loan would be required to be repaid on the basis of production (USGS, *Mining properties* 14; Brooks 107). Finally, according to Brooks, Bartell did concede that the actual production for the mines was in fact far higher than had been previously reported and more accurately should have totaled 22,800 pounds of mercury, although the accuracy of this figure has not been verified either. By way of comparison, the Bonanza Mine in Douglass County, one of Oregon's five largest mercury mines, produced roughly 3,000,000 lbs. of mercury, making it roughly 100 to 200 larger than these sites together, so in that respect these discrepancies are relatively marginal, they nevertheless illuminate the inaccuracies of the record and invite the researcher to take a closer look (ODEQ, *ECSI* 1).

Fig. 14. Furnace at the Kiggins Mine.
Note: The furnace has been built into a natural fissure in the area rock.
Photo original by Bill Tompkins has been cropped by the author.

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Fig. 15. Furnace at the Nisbet Mine.
Note: Over 20 feet tall, it is surrounded by the remains scaffolding presumably for the service of the furnace operations as well as 10" pipes presumably for condensing mercury vapor back to liquid.
Photo by author.

If the production figures for the Kiggins and the Nisbet are accepted as an inexact range of 13,148– 22,800 pounds of mercury, one could use that range to estimate other calculations relevant to understanding the potential impact the mine may have had on the watershed, like the amount of waste rock that might have been generated at the site as well as what amount of mercury vapor might have escaped condensation within the furnaces' workings to condense freely into the airshed. With regard to the calculation of waste-rock that the mine would have processed, Brooks ascribes the grade of the ore for some of the mines' workings as having ranged from a low-end yield of 6 pounds of mercury per ton of ore to a high-end approaching 12 pounds of mercury per ton of ore. (Brooks 107-109). Conservatively this would suggest that at least 2191 tons of ore would have been generated while generously just 1096 tons or ore might have been processed. With regard to the question of how much mercury was lost through production inefficiencies, as Schuette has suggested that furnaces should operate with 95% efficiency, this would imply that the mines might have inadvertently released up to 674 pound of mercury into the air, soil and water (Schuette 27). While these estimates may be grounded in the best historical data available and may be potentially sound enough to help guide some decisions, they clearly lack exactitude and do not begin to measure the actual impacts of the mine.

An unusual result of the preliminary surveys of the mine sites is that arsenic has been detected in considerable amounts, which is surprising because arsenic is not added into the processing of elemental mercury from its ores, nor is it a natural chemical by-product of processing mercury from cinnabar (USFS, *Kiggins* 3; USFS, *Nisbet* 3; Brooks 5-7). Cinnabar, however, isn't the only ore that mercury can be found in, and in fact over 25 other minerals are known to contain mercury (Brooks 19). Schwatzite, a mercury ore not yet established to be on the Kiggins or Nisbet sites is a mercury ore that has been found to contain as much as 10% arsenic (USFS, *Kiggins and Nisbet* 3; Brooks 19). Moreover, Jordesite, a rare molybdenum disulfide that has been shown to contain over

0.1% arsenic, has also been found at the site and may be a contributing factor (USFS, *Kiggins and Nisbet* 3; Staples). Arsenic has shown up as a contaminant at a handful of mercury mines in Oregon, including the War Eagle outside of Medford, the Blue Bull Mine south of the Steens Mountains as well as the Bonanaza Mine in Douglas County (Brooks 69, 202; ODEQ, *ECSI* 2). Unfortunately, without knowing the how the arsenic is being introduced into the site in the first place, attempting to deduce or otherwise estimate the extent of the arsenic is highly problematic.

Accurate site testing, especially for mercury, is still no easy task to accomplish. Mercury's insolubility, its specific gravity being over 13 times the weight of water, its mobility, its persistence in resisting chemical degradation in the environment combined with its potency in extremely minute traces require ultra-clean sampling protocols as well an extensive breadth of sampling in order to produce accurate and meaningful measurements of mercury as it occurs in the environment (Kalff 520; USGS, *Mercury*). Because of these challenges Kalff has written that there effectively is no reliable data anywhere for mercury prior to 1989 (520). Some recent fieldwork has begun already, revealing elevated levels of arsenic that at four separate locations at the mines (see Appendix - A) (USFS *Kiggins* 3; USFS *Nisbet* 3).

More than waste rock or mineral residues were left behind, however. Significant amounts of mining equipment still remain, some of which are plainly on site, while still more have washed downstream to remarkable distances (see figs. 16, 17, 18, 19, 20 and 21). Due to the high amount of contact some of these items would have had with ore, metal and wastes from the mines, these items may be among the most contaminated parts of the mines, but compared to the complexity of identifying and remediating varied dispersals among soil or water, determining the hazard that mining items pose and executing any clean-up they may require may be the simplest aspects on site to attend to. Not surprisingly, however, the site is less than intact. Over the years a number of pieces of equipment have been carted off, even including an old ore crusher (Tompkins).

Fig. 16. Retort for roasting ore at the Kiggins Mine.
Note: The photo was taken with a water bottle 8" in height included for scale.
Photo by the author.

Fig. 17. Glass jug top at the Kiggins Mine.
Note: The photo was taken with a water bottle 8" in height included for scale.
Photo by author.

Fig. 18. Conveyor apparatus and ore hopper at the Kiggins mine. Note: The rock crusher that used to be found beneath the ore hopper was removed from the site between 2000 and 2002. Note: The photo was taken with a water bottle 8" in height included for scale. Photo by author.

Fig. 19. Diesel motor at the Kiggins Mine.
Note: The photo was taken with a water bottle 8" in height included for scale.
Photo by author.

Fig. 20. Ore-car downstream from the Kiggins Mine.
Note: The metal container inset within the ore-car appears to be built-in, although its exact function remains unclear to the author. Note: The photo was taken with a water bottle 8" in height included for scale. Photo by author.

Fig. 21. Wheelbarrow remnant downstream from the Kiggins Mine.
Note: This wheelbarrow remnant was found in the river and was photographed after being repositioned by employing nearby sticks in evocation of handles and with a rock serving in the place of where its wheel might have been in order facilitate its recognition by the viewer. No wheelbarrow remnants were harmed in the creation of this dramatic portrayal. While based on a composite of real wheelbarrows, this portrayal of a wheelbarrow is entirely fictional, and, it does not represent any particular wheelbarrow, living or dead. Photo by author.

Potential Impacts:

The greatest health risks associated with mercury come from its methylated form, which is both more toxic and more persistent in nature than the elemental or inorganic forms of mercury that methylmercury is derived from (EPA, *Mercury Compounds* 2). How the methylation of mercury occurs in nature is still the subject of research among scientists, although the growing body of research suggests that water-born elemental or inorganic mercury is first adsorbed to detritus and then converted to its methylated form by microbes, bacteria and molds which are either ingested by other organisms directly carrying the methylmercury on up through the food web or the methylmercury passes through the microbes' systems then to be adsorbed by plankton which them are taken up through the food web (USGS, *Mercury Contamination*; Coe 372). Because of its resistance to degradation and because it binds directly with animal proteins, methylmercury tends to accumulate in greater and more toxic concentrations through each trophic level over time (USGS, *Mercury Contamination*). Consequently with all things being equal, older fish of comparable size to younger ones will tend to have higher levels of methylmercury in their tissue, and generally bigger fish will tend to accumulate more than smaller ones do (USGS, *Mercury Contamination*). While mercury's health hazards do vary among its different forms, all are quite toxic though methylmercury is the worst, causing neurological dysfunction and birth defects and is a possible human carcinogen as well (EPA, *Mercury Compounds* 1).

The science on the prevalence of arsenic's occurrence and on the health hazards it causes has been expanding so much recently that in 2006 the USEPA is slated to implement a revised arsenic standard that is five times more stringent than the one in effect today (ODHS *Arsenic* 4; USGS *Arsenic* 3*;* EPA, *Arsenic in Drinking Water* 1). Arsenic occurs naturally and in Oregon is commonly associated with volcanic rock (ODHS, *Arsenic* 2). The United States Geological Survey conducted a study of arsenic in the Willamette Basin in 1996 to determine the distribution of arsenic and while finding that that 8% of their samples were in excess of the EPA's standards they also confirmed that high arsenic levels did correlated to specific types of the area's geology (USGS, *Arsenic* 1). Arsenic is a grey colored metal that can be taken up through inhalation, ingestion or dermal exposure, and is a known cancer causer in humans (EPA, *Arsenic Compounds;* ODHS, *Arsenic* 3-4).

At risk is the health of the watershed. The Clackamas is home to a diversity of biota, including a number of threatened or endangered species. In their March 2003 analysis of the mine sites, the Oregon Department of Environmental Quality identified populations of threatened or endangered chinook salmon, coho salmon, steelhead, bull trout, northern spotted owl and Townsend's big ear bats all within two miles of the mines (ODEQ, *Kiggins* 9; ODEQ, *Nisbet* 9). In addition to the wild stocks subject to protection under the Endangered Species Act, the Clackamas is also home to an active sport-fishery supported in part by Portland General Electric in keeping with their existing federal licensing requirements for their hydroelectric dams on the Clackamas to promote the recreational uses of the reservoirs by stocking the reservoirs with catchable trout (Clackamas River System 1). Moreover, the populations of Estacada, Oregon City, West

Linn, Lake Oswego, Gladstone and Milwaukie, some 200,000 users in total, rely on the Clackamas for their drinking water every day (Clackamas River Basin).

Remediation Determination Pending:

The dams on the Clackamas that have displaced the river, made space for the mines, and reduced downstream erosion now may be operated in ways that bring about greater flow in the river, increased erosion downstream, and potentially the displacement of the mines themselves. The federal relicensing requirements for PGE's hydroelectric projects on the Clackamas, due to be finalized in 2006, are expected to result in some significant modification of their operations including the requirement of increased through flows to better attend to the needs of threatened and endangered salmon in the river (Shibahara). Because the relicensing requirements have not yet been completed, it is not clear how much the flow will increase; however, documents dated March, 2003 from the ODEQ indicate that the dam immediately above the mines at Harriet Lake [reservoir] has been proposed for complete removal (ODEQ, *Kiggins* 14; ODEQ, *Nisbet* 14). If mine remediation doesn't occur prior to the increased flows then any toxics that remain on-site and downstream risk being agitated and released into the watershed at greater rates than they have in the past. On the other hand, if the mines were remediated before the flows increase, these impacts would be mitigated.

As the party with direct responsibility for attending to remediation of the mines under state and federal law, and with the added support of congressional funding dedicated for the remediation of abandoned mine sites, the USFS has been advancing toward a clean-up action at the Kiggins and Nisbet mines since October, when their investigations detected hazardous levels of arsenic at multiple sites throughout the mines (Fortuna; DeRoo; USFS, *Kiggins* 3; USFS *Nisbet* 3). Mercury's high mobility, heavy specific gravity, and insolubility all contribute to its persistence in nature and pose technical challenges for remediation efforts (Cole 372). Recent remediations of other mercury mine sites in Oregon have emphasized the excavation and sequestration of contaminated soils, although other innovative methods for the reduction of mercury contamination have been demonstrated, including the introduction of a *Pseudomonas* strain that has been shown to remove mercury from wastewater, as well as a high-vacuum high-temperature rotary kiln that extracts mercury from mining residues (Sowa; ODEQ, ECSI 2; EPA, *Technical*; USDOE). Arsenic can be treated from drinking water through activated alumina, electrodialysis, ion exchange resins, and reverse osmosis though no single treatment is 100% effective (ODHS, *Arsenic* 4). As of February, 2004 the financial cost of site remediation was projected at $800,000, but while the formal USFS site inspection has now been completed, the USFS is calling for additional study before moving forward with their decision making process (USFS, *Kiggins and Nisbet* 4; DeRoo). That further study could be completed in a matter of months (DeRoo).

Recommendations:

Concern for water quality, the costs of remediation and other competing priorities should all be weighed in the decision making process. While without site remediation increased river flows may result in increased mine waste run-off into the watershed, yet the extent of any negative results of that action are unknown, and if the mines are remediated to the exclusion of another site with a greater hazard, then the costs will have ultimately been mis-spent. In addition to the need to account for the risks posed to downstream users of the watershed, the site itself is a hazard to recreational visitors at the mines and a mitigation of their risks should also be undertaken in the decision making process. To facilitate the pace and the refinement of the decision making process, there should also be regularized stakeholder meetings whereby the parties with direct relationships to the water, soils and other public uses of the site like ODEQ, ODFW, ODHS, PGE, the USFS and others can coordinate their information, concerns and actions together.

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APPENDIX A – CERCLA Related Activity Timeline at the Kiggins-Nisbet Sites

Date	Activity
10/02	Testing performed by USFS personnel in association with USFS Abbreviated Preliminary Assessment Checklist indicates detection of arsenic at levels in excess of EPA standards at mine sites. Sites are graded to be a "high priority" for additional study.
3/03	Analysis by ODEQ personnel is association with Site Assessment Prioritization System (SAPS) Guidance & Worksheet grades the site as a "High Priority" for further action.
4/03	USFS completes Abbreviated Preliminary Assessment for the Kiggins site concluding that a full Site Inspection should be performed.
5/03	USFS completes Abbreviated Preliminary Assessment for the Nisbet site concluding that a full Site Inspection should be performed.
9/03	Field Operations Plan for a full Site Inspection is prepared by a private contractor for the USFS projecting that investigative fieldwork will begin within the month.
2/04*	Site Inspection report completed for the USFS.
2/04	USFS issues memorandum initiating "CERCLA activities" declaring that a potential "threat to public health welfare or the environment has occurred or may occur…" from the mines.

*USFS memo of 2/04 states SI was completed 2/04, however USFS website indicates that SI was completed on 3/04. SI is not available on USFS website at this time for verification.